

CLAIMS

I claim:

1. Apparatus for handling material, including

at least one sucker for lifting-release of the material, that provides a vacuum, obtained between said sucker and the material to be handled, generated by vacuum forming means by means of Venturi effect or by means of a vacuum pump;

characterized in that the apparatus is made up of a multi-way pneumatic circuit of an auto-selection valve, that includes main pneumatic commutators, said commutators being interconnected to a third pneumatic commutator interposed between the vacuum forming means and the auto-selection valve.

2. Apparatus for handling with suckers, according to claim 1, characterized in that it is essentially divided into blocks, to which at least one sucker is connected; respectively, a first block is made up of a pneumatic installation for the supply of dependent blocks, the second and third, comprising an auto-selector valve that interacts with vacuum generation means, said first block being essentially made up of pressure regulators and interacting commutator electro-valves with an alternative valve; wherein said first block supplies a second block that includes the auto-selection valve and is substantially made up of pneumatic commutators, a relief valve and vacuum generator means.

3. Apparatus for handling with suckers, according to claims 1 and 2, characterized in that the block that includes the pneumatic installation supplies one or more suckers, just as the block that includes an auto-selector valve that interacts with vacuum generation means is applied to every sucker or group of suckers.

4. Apparatus for the handling with suckers, according to previous claims, characterized in that the auto-selection valve includes two pneumatic commutators, each provided with an axially movable and elastically yielding piston.

5. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that in the case of activation, through an impulse the electro-valves of the first block are excited so that by means of a first electro-valve the air impulse passes through the pneumatic commutators of the second block to supply the vacuum generator; while with the second electro-valve, the airflow supplies a first pneumatic commutator, in such a way as to determine the movement of the second piston; in this case the air originating from the electro-valve, passes through the alternative valve, moves the sphere allowing the supply of the circuit, which on entering into the second block determines the movement of said piston.

6. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that the airflow originating from the first electro-valve of the first block, entering into the subsequent block for a few seconds, activates a depression in the circuit and therefore maintains the piston of the pneumatic commutator in auto-relief

7. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that at least one pneumatic commutator of the second block is provided with a more rigid spring.

8. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that the airflow introduced from a first electro-valve, passes first through the pneumatic commutators to the piston of the second block, then through a third pneumatic commutator provided with a more rigid spring, to supply the vacuum generator that raises the sphere of the relief valve thus supplying the circuit with a depression that simultaneously supplies the sucker for the movement of the material and the piloting of the circuit.

9. Apparatus and circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that the piloting depression, passing through the perforations of the shaft of the piston of the first pneumatic commutator, forms an eddy in the upper chamber of the commutator maintaining said piston in position 0.1, forming an auto-relief circuit.

10. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that the auto-relief function is activated when the vacuum has reached a sufficient depression value to maintain the piston of the second pneumatic commutator in raised position.

11. Apparatus for handling with suckers, according to previous claims, characterized in that there is a connection between the lower chamber of the shaft and the upper chamber of the piston.

12. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that in the case that the sucker should suffer a substantial loss of adherence or detaches, the auto-relief of the second commutator of the second block is automatically de-excited, automatically interrupting the supply of the vacuum generator.

13. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that in the stand-by phase, the first pneumatic commutator of the second block equipped with a sturdier spring than the spring of the second commutator, by increasing depression allows the movement of the piston to the high position, subsequently with respect to the first commutator, placing it into the auto-relief position, in such a way as to interrupt the airflow originating from the first electro-valve of the first block, destined to supply the vacuum generator.

14. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that during the loss of depression phase, the piston of the first pneumatic commutator moves, placing itself in a low position, so that the airflow originating from the first electro-valve of the first block supplies the first pneumatic commutator in a high position which in turn, through the third pneumatic commutator, will supply the vacuum generator that re-opens the relief valve.

15. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that the depression re-activation phase makes provision for the circuit depression value to return to the maximum on the re-opening of the relief valve, in this way re-positioning by auto-relief the piston of the first pneumatic commutator to a high position and thus re-closing the compressed airflow originating from the first electro-valve of the first block with similar closure of the relief valve.

16. Circuit for an apparatus that carries out handling with suckers, according to previous claims, characterized in that the detachment phase of the sucker from the material, takes place continuously to maintain the first electro-valve of the first block excited and exciting a third electro-valve, which makes a higher air pressure flow to the circuit than the pressure flowing to the second electro-valve, thus moving the sphere of the alternative valve; the air with a higher pressure than that exerted for the activation of the system for the adherence of the materials maintains the piston of the first pneumatic commutator in high position, moreover it moves the cursor of the third pneumatic commutator to a low position, in this way blocking the supply of the vacuum generator means, bypassing the airflow directly to the circuit to the sucker.

17. Apparatus according to previous claims, characterized in that vacuum generator means of the type with Venturi effect are used.

18. Circuit and apparatus that carries out handling with suckers, characterized in that a vacuum pump is provided that supplies the circuit for the sucker detachment phase with a pressurized airflow, exciting the first electro-valve and de-exciting a fourth electro-valve, when for all the other previous phases the circuit is supplied by a line in depression rather than under pressure.